

WHAT IS CLAIMED IS:

1. A magnetoresistance effect element, comprising:
a nonmagnetic spacer layer,
first and second ferromagnetic layers separated by the nonmagnetic spacer layer, the first ferromagnetic layer having a magnetization direction at an angle relative to a magnetization direction of the second ferromagnetic layer at zero applied magnetic field, the second ferromagnetic layer comprising first and second ferromagnetic films antiferromagnetically coupled to one another and an antiferromagnetically coupling film located between and in contact with the first and second ferromagnetic films for coupling the first and second ferromagnetic films together antiferromagnetically so that their magnetizations are aligned and remain antiparallel with one another in the presence of a magnetic field signal, the magnetization of the first ferromagnetic layer being freely rotatable in response to the magnetic field signal; and
a nonmagnetic high-conductivity layer disposed in contact with the first ferromagnetic layer so that the first ferromagnetic layer is disposed between the nonmagnetic spacer layer and the nonmagnetic high-conductivity layer.
2. The magnetoresistance effect element of claim 1, wherein the first ferromagnetic layer has a film thickness between 0.5 nanometers and 4.5 nanometers.

3. The magnetoresistance effect element of claim 1, wherein the first ferromagnetic layer has a film thickness between a mean free path for conduction electrons having spin antiparallel to the magnetization direction of the first ferromagnetic layer and a mean free path for conduction electrons having spin parallel to the magnetization direction of the first ferromagnetic layer.

4. The magnetoresistance effect element of claim 1, wherein the nonmagnetic high-conductivity layer and the second ferromagnetic layer have a film thickness so that wave asymmetry, $(V1-V2)/(V1+V2)$, is in the range of negative 0.1 and positive 0.1, in which V1 is the peak value of reproduction output in a positive magnetic field signal and V2 is the peak value of reproduction output in a negative magnetic field signal.

5. The magnetoresistance effect element of claim 1, wherein the first ferromagnetic layer responds to a magnetic field H_{in} of interlayer coupling between the first and second ferromagnetic layers, a stray magnetic field H_{pin} of second ferromagnetic layer, and a current magnetic field H_{cu} of electric current applied to the first ferromagnetic layer, and sum of H_{pin} , H_{in} , and H_{cu} is substantially zero in center of film thickness of the first ferromagnetic layer.

6. The magnetoresistance effect element of claim 1, wherein the second ferromagnetic film is disposed adjacent to the

nonmagnetic spacer layer via the first ferromagnetic film,
the nonmagnetic high-conductivity layer has a film thickness
 t (HCL) in terms of copper (Cu) layer of specific resistance
10 microhm centimeter,

the first and second ferromagnetic films have a magnetic film
thickness t_m (pin1) and t_m (pin2), respectively, in terms of
saturation magnetization of 1 Tesla, and

t (HCL) , t_m (pin1) and t_m (pin2) satisfy conditions of 0.5
nanometers $\leq t_m$ (pin1) - t_m (pin2) + t (HCL) ≤ 4 nanometers and t
(HCL) ≥ 0.5 nanometers.

7. The magnetoresistance effect element of claim 1, wherein
the nonmagnetic high-conductivity layer is formed of a material
having a bulk resistivity at room temperature not larger than
10 microhm centimeter.

8. The magnetoresistance effect element of claim 1, wherein
the nonmagnetic high-conductivity layer is formed of a material
having a resistivity so that a substantially large number of
majority carriers having a spin parallel to the magnetization
direction of the first ferromagnetic layer exist in the
nonmagnetic high-conductivity layer.

9. The magnetoresistance effect element of claim 1, wherein
the nonmagnetic high-conductivity layer contains a metal
element selected from the group consisting of copper (Cu), gold
(Au), silver (Ag), ruthenium (Ru), iridium (Ir), rhenium (Re),
rhodium (Rh), platinum (Pt), palladium (Pd), aluminium (Al),